Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09427, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09427
EGU General Assembly 2008

Towards a coupled three-dimensional glacier/ mass balance model of the Morteratschgletscher, Engadin

P. Huybrechts (1), Oleg Rybak (1), Johanna Nemec (1), and Olaf Eisen (2)

(1) Departement Geografie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, Belgium, (2) Alfred-Wegener-Institut für Polar- und Meeresforschung, Postfach 120161, D-27515 Bremerhaven, Germany (Contact Email: phuybrec@vub.ac.be)

The significant retreat of Alpine glaciers over the 20th century is a strong indicator of climatic warming. Many glaciers are well on track to their complete distinction in the course of the 21st century. The Morteratschgletscher in the Engadine (Switzerland) is a typical example of a large valley glacier with a detailed record of front variations dating back to the end of the Little Ice Age. It currently has a length of about 7 km and a surface area of 16 km2 and may already have lost up to 40% of its ice volume since 1860. We have measured mass balance, ice thickness, and surface velocity over a 6-year period since 2001. Mass balance and velocity measurements were performed at about 20 locations in the ablation zone and supplemented with shallow ice core and pit measurements in a saddle area at 3670 m elevation and below one of the surrounding summits at 3750 m. In addition, the ice thickness was measured with two radar systems in around 250 individual locations and along several km of continuous transects. These data will serve as input in a coupled three-dimensional glacier/ mass balance model to better understand the observed retreat since the 19th century and to be able to make predictions about its future evolution. The mass balance model considers a parameterisation for the surface energy fluxes, an albedo which decreases exponentially with snow depth as well as the shading effect of the surrounding mountains. It was calibrated with the observations between 2001 and 2006 using meteorological data from surrounding synoptic stations. The ice flow model considers both longitudinal and transverse stress gradients in the force balance in addition to the usual terms of the shallow-ice approximation. The poster will show the reconstructed glacier geom-

etry and mass balance evolution obtained from the field programme. First results on the validation of the flow model with the observed velocity data and on the modelling of the surface mass balance model will also be shown.